

CLAIMS

What is claimed is:

1. A method for operating a wireless data communication system in which a relay station having a directional antenna forwards messages from a first node to a
5 second node using a wireless physical layer signaling protocol, the method comprising the steps of:
receiving from the first node a wireless transmission for delivery at the second node;
determining an identification of the second node from an initial portion
10 of the wireless transmission;
determining, using the second node's identification, a preferred antenna angle for the directional antenna;
steering the directional antenna according to the preferred antenna angle;
and
15 retransmitting the wireless transmission to the second node using the directional antenna.
2. The method of claim 1, wherein the wireless data communication system is a wireless Local Area Network (LAN).
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3. The method of claim 1, wherein the wireless transmission is received at the first node using a substantially omni-directional antenna.
4. The method of claim 1, wherein the wireless transmission is received at the first
25 node using the directional antenna.
5. The method of claim 4, wherein the directional antenna is operated in an omni-directional antenna mode.

6. The method of claim 1, wherein determining the identification of the second node comprises utilizing messages at a protocol layer higher than a physical layer.
- 5 7. The method of claim 6, wherein determining the identification of the second node comprises utilizing a preamble portion of a Media Access Control (MAC) protocol layer.
8. The method of claim 6, wherein determining the identification of the second
10 node comprises utilizing a link layer establishment message of a link protocol layer.
9. The method of claim 8, wherein the link-layer establishment message is a Request To Send (RTS) message.
- 15 10. The method of claim 1, wherein determining the preferred antenna angle comprises:
 - locating the second node's identification in a lookup table storing a predetermined association between a node's identification and its preferred
20 antenna angle; and
 - determining the preferred antenna angle from the stored association for the second node's identification.
11. The method of claim 10, wherein the second node's identification is an Internet
25 Protocol (IP) address.
12. The method of claim 10, wherein the preferred antenna angle corresponds to the best angle for propagation to the second node.

13. The method of claim 10, wherein the predetermined association between the second node's identification and its preferred antenna angle is determined by:
- stepping the antenna through a plurality of directional angles;
 - receiving a wireless transmission from the second node at each of the
 - 5 plurality of directional angles;
 - determining a received signal metric relating to the received signal;
 - identifying the directional angle having the best received signal metric;
 - associating the identified angle with the second node; and
 - recording in the lookup table the association of the identified angle with
 - 10 the second node's identification.
14. The method of claim 13, wherein the steps of determining the preferred antenna angle are repeated for a plurality of nodes and the associations of each identified angle with its respective node's identification is stored in a lookup table.
15. The method of claim 13, wherein the received signal metric is selected from the group consisting of: Received Signal Strength Indication (RSSI); Bit Error Rate (BER); noise power level; and combinations thereof.
16. An apparatus for operating a wireless data communication system in which a relay station having a directional antenna forwards messages from a first node to a second node using a wireless physical layer signaling protocol comprising:
- means for receiving from the first node a wireless transmission for
 - 20 delivery at the second node;
 - means for determining an identification of the second node from an
 - 25 initial portion of the wireless transmission;
 - means for determining, using the second node's identification, a
 - preferred antenna angle for the directional antenna;
 - means for steering the directional antenna according to the preferred
 - 30 antenna angle; and

means for retransmitting the wireless transmission to the second node using the directional antenna.